Business cycles,bilateral trade and international financial intergration : Evidence from Economic Community of West African States (ECOWAS)

Zouri, Stéphane

Paris School of Economics, Université Paris 1 Panthéon Sorbonne

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Business cycles, bilateral trade and international financial integration: Evidence from Economic Community of West African States (ECOWAS)[1]

Stéphane ZOURI

Paris School of Economics & University Paris 1 Panthéon-Sorbonne

stephane.zouri@psemail.eu

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Abstract: This paper identifies the determinants of synchronization of business cycles in ECOWAS because it allows decision-makers to better target their economic policies. It is relevant given the willingness of ECOWAS heads of state to create a single currency by 2020. Indeed, conducting actions in the direction of the synchronization of business cycles is important because the asymmetries of the cycles observed within a monetary union determine its sustainability. Unlike previous studies in this area, it is innovative as it takes into account international financial integration. In addition, it proposes new measures to increase the quality of results. Finally, it takes into account the structure of trade by analyzing inter-regional links. The results show that bilateral trade and financial openness are determinants of the synchronization of business cycles in the region. However, they show that, trade channel dominates financial openness channel. In addition, the results show that the weakness of intra-community trade doesn't constitute a barrier to monetary union.

Keywords: business cycles, trade intensity, financial integration, ECOWAS.
JEL classification: E32, F15, F36, O55.

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1. Introduction

The creation of a monetary union is a "double-edged" knife. In fact, if the monetary union makes it possible to limit the uncertainties linked to exchange rate fluctuations, increases foreign direct investment, increases intracommunity trade, it is also binding. Indeed, member countries of a monetary union must abandon their monetary sovereignty. Thus, the exchange rate can no longer represent a short-term adjustment variable. In addition, monetary policy ceases to be national and a common monetary policy is now carried out at the scale of the zone. The action of the common Central Bank is thus more effective than when the cycles of the states are synchronized.

Indeed, the synchronization of the cycles has the advantage of increasing the effectiveness of the monetary policy because when the countries are not on the same phase of the cycle (some in expansions and others in recessions) then the common monetary policy will be certainly favorable to one to the detriment of others. Thus, the identification of cycle synchronization determinants allows decision-makers to better target their economic policies. For instance, the effects of trade liberalization or financial openness on the synchronization of business cycles make it possible to verify respectively the relevance of free trade agreements or national financial regulations in terms of the convergence of economies.

This is how many studies have focused on trade integration (Baxter et Kouparitsas, 2005; Caldéron et al. 2007; Inklaar et al. 2008; Frankel et Rose, 1998; Tapsoba, 2009), financial integration (Imbs, 2004; Kalemli-Ozcan et al. 2001; Kose et al. 2003), and common shocks (Chebbi et Knani, 2013; Duarte et Holden, 2003; Roos et Russel, 1996) as key determinants of business cycles synchronization. Other less established determinants in the literature, such as monetary policy convergence (Otto et al. 2001), fiscal policy convergence (Darvas et al. 2005), and degree of specialization (Imbs, 2004) can also increase the synchronization of business cycles.

This paper considers bilateral trade and financial openness as key determinants of business cycles synchronization in ECOWAS. These two factors deserve special attention because the first one makes it possible to verify the endogenous hypothesis of the region in the sense of Frankel and Rose (1998) and the second is relevant in view of the financial crisis of 2008 which contributed to highlight the importance of financial links. However, the relationship between these determinants and the synchronization of cycles is often ambiguous.

For instance, Frankel and Rose (1998) argue that greater trade integration strengthens the synchronization of business cycles, while Krugman (1993) indicates that the opposite result can be observed if trade integration is accompanied by greater specialization of countries in sectors where they have comparative advantages. In addition, Kalemli-Ozcan et al. (2001) argue that financial integration allows for better risk sharing and leads economies to specialize in areas where they have comparative advantages, which reduces the synchronization of business cycles, while Kose et al. (2003) find that financially open countries are more synchronized.

The paper aims to analyze the links between these determinants and the synchronization of business cycles. It is relevant given the willingness of ECOWAS heads of state to create a single currency by 2020.

ECOWAS consists of two zones. It is the WAEMU (West African Economic and Monetary Union) zone which has eight countries and shares a common currency called “Franc

CFA" since 1962 and the Non-WAEMU zone which counts seven countries each having its national currency. Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo constitute WAEMU. The Non-WAEMU zone consists of Cabo Verde, The Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone. In addition, the ECOWAS countries conduct separate monetary policies and adopt different exchange rate regimes. According to the International Monetary Fund's Exchange Rate Regime Report (2016), WAEMU adopts a fixed exchange rate regime while countries in the Non-WAEMU zone present fixed, flexible and indefinite exchange rate regimes.

Moreover, Nigeria as a full member of ECOWAS has a much larger economy than any other member. Indeed, it represents 75% of the Gross Domestic Product (GDP) of the region (World Bank, 2015). Also, the economy of Nigeria is, unlike most other countries in the region, highly dependent on crude oil exports. Thus, when oil prices are high, Nigeria may experience strong expansion, which justifies a restrictive monetary policy, while its oil-importing neighbors may suffer from weak growth or recession requiring expansionary monetary policy. In addition, the specialization of the countries of the region vis-a-vis the export of raw materials promotes a situation of structural vulnerability linked to the significant volatility of the terms of trade (Bénassy-Quéré and Coupet, 2005).

These are all potential factors that can contribute to reduce the synchronization of business cycles in the region and thus hinder the process of creating a single currency according to optimum currency area theories (Bayoumi and Eichengreen, 1993; Cohen and Wyplosz, 1989; Weber 1990). However, the asymmetry of the cycles should not block the political decision for an enlarged monetary union if the economic decision-makers of the zone manage to identify factors making it possible to increase the synchronization of the business cycles. They will thus be able to focus their policies around its determinants in order to contribute to the cycles come closer.

The paper complements an infrequent and less recent empirical literature (Tapsoba, 2009) on the determinants of the synchronization of business cycles in West Africa. It is innovative at four levels:

Firstly, unlike previous studies in this region, the paper takes into account international financial integration as a potential factor in the synchronization of business cycles. This factor only become widespread after the 2008 financial crisis, which helped to emphasize the importance of financial linkages. Although it is still necessary to evaluate how financial openness affects the synchronization of business cycles, the question has become paramount since 2008, for both policy makers and researchers.

Secondly, the paper uses a simple and intuitive measure of the synchronization of business cycles that is not only easily observable at high frequency, annual or quarterly but is not sensitive to various filtering methods. Moreover, it takes into account the bias related to country size in the calculation of trade-to-GDP ratio as it is well known that a country with a small population trades relatively more as part of their GDP (Samimi et al. 2011; Riezman et al. 2013).

Thirdly, the paper takes into account the structure of trade by analyzing the impact of trade integration between ECOWAS countries and the Eurozone (first trading partner of the region) on the synchronization of business cycles. Indeed, the structure of foreign trade shows a

weakness of intracommunity trade comparatively of trade between West African countries and the Eurozone. If the weakness of intra-regional trade certainly limits the potential gains of a monetary union, it is not problematic if the inter-regional links also contribute to bringing business cycles closer.

Fourthly, the paper shows that the analysis of the determinants of the synchronization of cycles in response to specific shocks in ECOWAS cannot be carried out without a control of the common shocks which can affect differently the heterogeneous countries and thus to falsify the predictions. Indeed, given the economic structure of the member states of the region, which differs from one country to another, countries do not react in the same way to a common shock. Thus, it is necessary to conduct an exhaustive study by controlling the common shocks with heterogeneous effects on the countries of the region, which makes it possible to increase the quality of the results.

The analysis focuses on the fifteen ECOWAS countries and covers the period 1980-2015. The results of the study show that bilateral trade and financial openness are the determinants of business cycles synchronization. In addition, bilateral trade between ECOWAS and the Eurozone contributes to increase the synchronization of business cycles. Finally, the study shows that in response to common or specific shocks, bilateral trade tends to increase the synchronization of business cycles, while international financial integration increases the synchronization of business cycles in response to common shocks.

The rest of the study is organized as follows. The second section introduces a brief overview of the foreign trade and international financial integration in the region, the third describes the methodology used, the fourth presents the results of the empirical analysis and the fifth section presents the economic implications of the different results.

2. Stylized facts

2.1 Foreign trade

Table 1 shows that the foreign trade of ECOWAS countries is oriented towards raw materials. Its dependence on the latter, whose prices are particularly unstable, promotes a situation of structural vulnerability linked to the significant volatility of the terms of trade. Among of export products, gold and cotton are the most common and most other products are specific to one or two countries. Refined oil is the main import product of ECOWAS countries and most other imported products are also specific to one or two countries.

According to Bénassy-Quéré and Coupet (2005), two countries with a similar dependence on the primary sector may have a different vulnerability to specific sectoral shocks depending on their dependence on a single product. This is the case of Nigeria, whose fall in the price of oil at the end of 2014 has been the most affected in Africa. As for Côte d'Ivoire, it has been able to take advantage of the fall in the price of oil, recording the best real GDP growth rate in West Africa in 2015 according to the report of the United Nations Economic Commission (2017).

The weakness of intracommunity trade is partly explained by the dependence of West African countries on the export of raw materials which limits the possibilities of bilateral trade between the countries. Indeed, according to chart 1, ECOWAS exports on average over the

period 2010-2015, 1% within the region, 12% towards the United-States of America (USA), 16% towards other sub-Saharan countries, 21% to the Eurozone and finally 50% towards the rest of the world. It imports on average over the period, 1% within the region, 10% from other sub-Saharan countries, 11% from the USA, 22% from the Eurozone and 56% from the rest of the world.

Table 1: main products of exports and imports in 2015

Weight	Countries	Exported products	Imported products
75.2%	Nigeria	Crude oil (77%) Petroleum gas (15%)	Refined oil (15%)
7.5%	Ghana	Gold (41%) Cocoa (19%) Crude oil (16%)	Refined oil (7%)
5%	Côte d'Ivoire	Cocoa (29%)	Crude oil (14%)
2.7%	Senegal	Gold (10%)	Refined oil (11%)
2%	Mali	Gold (59%) Cotton (20%)	Refined oil (11%)
1.6%	Burkina Faso	Gold (73%) Cotton (13%)	Refined oil (19%)
1.3%	Benin	Cotton (26%) Coconut and cashew nuts (21%)	Rice (10%)
1.3%	Guinea	Gold (38%) Aluminum (30%)	Refined oil (10%)
1.1%	Niger	Chemicals and radioactive (47%) Refined oil (12%)	Airplanes, helicopters and / or spacecraft (14%)
0.6%	Togo	Refined oil (17%) Calcium phosphates (10%)	Refined oil (49%)
0.6%	Sierra Leone	Diamonds (22%) Iron-ore (21%) Titanium ore (18%)	Refined oil (9%)
0.5%	Liberia	Ships and boats (45%) Iron-ore (24%) Rubber (12%)	Ships and boats (69%)
0.2%	Cabo Verde	Pisces (49%) Refined oil (13%)	Refined oil (11%)
0.2%	The Gambia	Wood (43%) Coconut and cashew nuts (34%)	Soft goods (15%)
0.2%	Guinea-Bissau	Coconut and cashew nuts (84%)	Refined oil (14%)

Source: the data come from the Observatory of Economic Complexity (OEC): https://atlas.media.mit.edu/fr

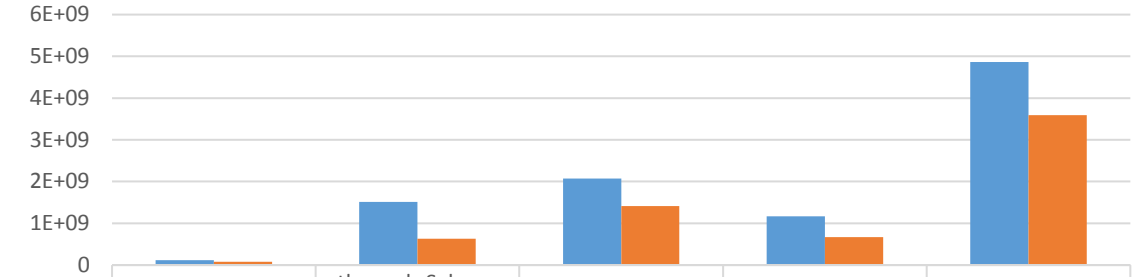
Note: products accounting for at least 10% of total exports and imports except Ghana and Sierra Leone where the first imported product is below the threshold. Weight = [USD current GDP of each country / USD current GDP of ECOWAS].

From the foregoing, intra-regional trade is of relatively limited scope in the ECOWAS region. This weakness certainly limits the potential gains of a monetary union. However, monetary unification in itself tends to increase the volume of trade. The low level of intra-regional trade in favor of trade between ECOWAS countries and the Eurozone, for instance, is partly explained by the nature of the exported and imported products by ECOWAS member countries. Indeed, the countries of the region are rich in natural resources but do not have the necessary technologies for processing commodities. Thus most of the exported products

(respectively imported products) are primary products to industrialized countries (respectively finished products from industrialized countries).

For the rest, the Eurozone is the main trading partner of the countries of the region, followed by other sub-Saharan countries and finally by the USA.

Chart 1 : trade (us current) and partners in ECOWAS over the period 2010-2015



	ECOWAS	other sub-Saharan countries	Eurozone	USA	Rest of the world
Exports	119652954	1509413805	2070372270	1169971355	4866590899
Imports	76627848	631063375	1413057303	669587204	3587287103

Source: Direction of Trade Statistics (DOTS) of International Monetary Fund (IMF).
Note: These are average values over the period 2010-2015. Sub-Saharan countries consists of ECOWAS and other sub-Saharan countries.

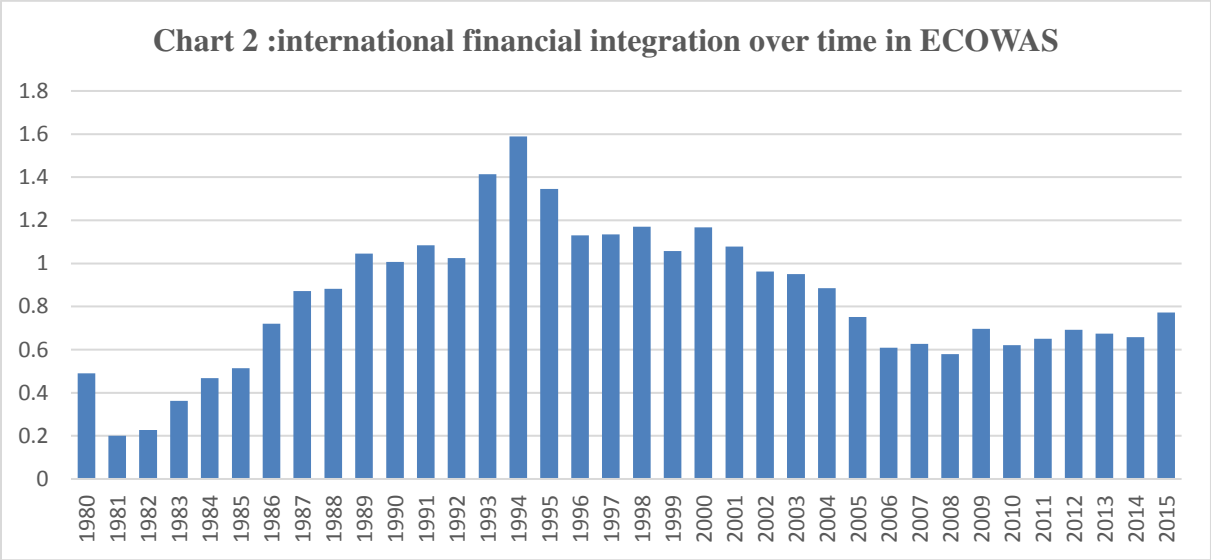
2.2 International financial integration

Recent decades have seen a rapid increase in international financial integration (IFI) in both industrial and emerging countries (Lane and Milesi-Ferretti, 2007). However, in West Africa, the situation is quite different. Chart 2 shows that IFI varies from period to period. Indeed, the period 1980-1994 is marked by an average increase of IFI while the period 1994-2015 is marked by a decrease on average. This decline is explained by the economic and political context of the countries of the region. Indeed, the devaluation of the "Franc CFA" in 1994, the devaluation of the Naira (Nigeria currency) in 1999, the politico-military crises in some countries of the region (The Gambia, Sierra Leone, Togo, Guinea-Bissau, Côte d'Ivoire) in the early years 2000 have restricted foreign investment.

Indeed, the devaluation of a national currency is generally the result of a critical situation of the national economy (in particular in WAEMU): increasing scale of financial unbalances with disastrous consequences on debt and economic growth (Revue d'Economie Financière, 2013). This devaluation doesn't exclude other structural adjustment measures if the expected effects are not achieved. This situation doesn't encourage investors in economic stability quest. In addition, political instability leads economic agents, risk-averse, to adopt a careful attitude by postponing or canceling any investment. It follows a leak of local investors and the repulsion of foreign investors, preferring to move towards more stable states.

In addition, compared to developed countries, IFI in ECOWAS is weak (Dufréno and Sugimoto, 2019). The reasons are twofold. First, the level of financial markets development is still weak. This retards financial integration because of the lower performance of commercial banks and financial companies (Lensik and Meesters, 2014). Second, financial markets are still

fragmented because banks and financial institutions operate in oligopolistic markets. This doesn't facilitate access to credit (Beck and Honohan, 2008).



Source: Philip R. Lane and Gian Maria Milesi-Ferretti (2017), "International Financial Integration in the Aftermath of the Global Financial Crisis," IMF Working Paper 17/115.
Note: the average is calculated on the 15 ECOWAS countries.

Financial integration deserves particular attention in ECOWAS because it can contributes to complete internal savings that are sometimes insufficient or poorly mobilized, improve the allocation of funding for high-yielding productive investments, contribute to increase the access of services in particular credit, to absorb the asymmetric of exogenous shocks, and to encourage more effective macroeconomic stabilization policies (Agénor, 2014).

3. Methodological framework

3.1 Modelization

In the recent literature (Cesa-Bianchi et al. 2018; Giannone et al. 2010; IMF, 2013; Kalemli-Ozcan et al. 2013a, 2013b), the synchronization between two economies i and j is measured on the basis of absolute differential in the real GDP growth rate between these economies. Based on this methodology, the paper defines the synchronization of business cycles as follows:

$$S_{ij,t} = - \left| G_{it} - G_{jt} \right| \quad (1)$$

Where G_{it} and G_{jt} represent the real GDP per capita growth rates at time t of countries i and j respectively.

The definition is such that $S_{ij,t}$ increases with the degree of synchronization, with negative values close to zero between synchronized countries. This measure has advantages. It is easily observable at high frequency (annual, quarterly) and takes into account the temporal variability,

unlike the correlation coefficient frequently used in the literature (Caldéron et al. 2007, Inklaar et al. 2008, Frankel and Rose, 1998, Tapsoba, 2009). In addition, it is not sensitive to the various filtering methods used in extracting business cycles which are criticized for many reasons[2] (Canova, 1998, 1999).

One of the main determinants of the synchronization of business cycles in this paper is bilateral trade (TI). It is measured in two ways:

Either by the amount of bilateral trade divided by the sum of the total trade of countries i and j (Baxter and Kouparitsas, 2005; Frankel and Rose, 1998; Tapsoba, 2009).

$$TI1_{ij,t} = \frac{M_{ij,t} + X_{ij,t}}{(M_{it} + X_{it}) + (M_{jt} + X_{jt})} \quad (2)$$

Where $X_{ij,t}$ is the nominal bilateral trade exports FOB (Free On Board) of country i to country j and $M_{ij,t}$ is the nominal bilateral trade imports CIF (Cost-Insurance-Freight) of country i from country j. $X_{i,t}$ ($M_{i,t}$) is the total nominal exports FOB (total nominal imports CIF) of the country i to the rest of the world (from the rest of the world).

Either by the amount of bilateral trade divided by the sum of GDP of countries i and j (Baxter et Kouparitsas, 2005; Frankel et Rose, 1998; Tapsoba, 2009). This measure is the subject of several criticisms, particularly that related to the size of the country. It is well known that a country with a small population trades relatively more as part of their GDP (Samimi et al. 2011; Riezman et al. 2013). Therefore, trade-to-GDP ratio is inversely related to country size. Arribas et al. (2006) propose a measure of the degree of openness called the "corrected degree of openness" which correct the domestic bias related to the size of the economy. Based on these authors, we propose the following measure:

$$TI2_{ij,t} = \frac{M_{ij,t} + X_{ij,t}}{GDP_{it}(1-a_{it}) + GDP_{jt}(1-a_{jt})} \quad (3)$$

Where $a_{it} = GDP_{it} / GDP_t^{ECOWAS}$ is the weight of economy i in ECOWAS.

The second determinant of the synchronization of business cycles is international financial integration (IFI). It is measured by following Lane and Milesi-Ferretti (2003):

$$IFI_{ij,t} = \frac{(FA_{it}+FL_{it}) + (FA_{jt}+FL_{jt})}{GDP_{it} + GDP_{jt}} \quad (4)$$

Where FA_{it} and FL_{it} refer respectively to the stocks of aggregate foreign assets and liabilities from country i at time t.

[2] One of the problems with the filtering method is the uncertainty about the appropriate value of the smoothing parameter for the annual data: Hodrick and Prescott (1997) initially propose 100, while Ravn and Uhlig (2002) recommend 6.25.

In contrast to the flow indicators that are often used in the studies, the stock measures provided by Lane and Milesi-Ferretti provide a better indication of the level of de facto financial openness (Allegret and Azzabi, 2014). However, as robustness, we will use the Chinn-Ito index (2006) as a measure of international financial integration.

To estimate the impact of bilateral trade and international financial integration on the synchronization of business cycles, we estimate the following equation:

$$S_{ij,t} = \alpha_{ij} + \gamma_t + \beta_1 * \ln(TI_{ij,t}) + \beta_2 * \ln(IFI_{ij,t}) + \eta_{ij,t} \quad (5)$$

The year effects γ_t account for global shocks that affect all countries homogeneously. The country-pair specific effect α_{ij} ensures β is estimated over time, in deviations from country pair averages, which constitutes a substantial improvement relative to earlier estimations typically obtained in cross-section. See for instance Frankel and Rose (1998), Baxter and Kouparitsas (2005), Tapsoba (2009), among many others. $\eta_{ij,t}$ represents the classic error term.

3.2 Estimation strategy

The one-step estimation of equation (5) by the "within estimator" is problematic because of the possible endogeneity of bilateral trade. Indeed, countries showing business cycle synchronicity are likely to trade more (or less) during common expansions (or common recessions). For this reason, the technique of Instrumental Variables (IV) is used. We instrument trade integration by the costs of bilateral trade by following Egger et al. (2019).

The intermediate equation is as follows:

$$\ln(TI_{ij,t}) = \mu_{ij} + s_t + \alpha_1 \ln(IFI_{ij,t}) + \alpha_2 \ln(\lambda_{ij,t}) + \varepsilon_{ij,t} \quad (6)$$

Where μ_{ij} and s_t are respectively the country-pair specific and the year effects. $\varepsilon_{ij,t}$ represents the classic error term. $IFI_{ij,t}$ represents here a control variable which is nothing other than the exogenous explanatory variable of equation (5) .$\lambda_{ij,t}$ represents the costs of bilateral trade and is measured as follows:

$$\lambda_{ij,t} = \frac{M_{ij,t}}{M_{ii,t}} \quad \frac{M_{ji,t}}{M_{jj,t}} \quad (7)$$

With $M_{ii,t}$ the country's import i from itself. Import from itself is the difference between the country's total output and the country's total export to the rest of the world (Bosker and Garretsen, 2007; Head and Mayer, 2004; Shang Wei, 1996).

3.3 Data and comparative analysis

3.3.1 Data

The annual data used come from the World Bank's World Development Indicators for GDP (current US) and GDP per capita (constant US 2010). Data (US current) on bilateral exports and imports, total exports (respectively total imports) to the rest of the world (respectively from the rest of the world) come from the IMF's Direction of Trade Statistics (DOTS). In addition, data for all economic industries relevant to the calculation of total output[3] come from the International Industrial Classification (ISIC Rev. 3) of the United Nations Statistics Division (UNSD).

Finally, data on the international financial integration of Lane and Milesi-Ferretti (2003) come from Philip R. Lane et Gian Maria Milesi-Ferretti (2017), "International Financial Integration in the Aftermath of the Global Financial Crisis," IMF Working Paper 17/115. Except for the dependent variable, all variables are transformed into logarithms. The study focuses on the fifteen ECOWAS countries and covers the period 1980-2015. Due to the unavailability of some data, the panel data is unbalanced. The correction of heteroscedasticity by the cluster method accounts for this limitation.

3.3.2 Comparative analysis

In this section, we conduct a comparative analysis of the main series of the study between the WAEMU zone and the Non-WAEMU zone in order to highlight the role of the single currency in ECOWAS.

Table 2 : descriptive statistics

Variables	ECOWAS			WAEMU (1)			Non-WAEMU (2)			**t-test** (1) = (2)
	N	**Mean**	**Std**	**N**	**Mean**	**Std**	**N**	**Mean**	**Std**	
$S_{ij.t}$	3383	-4.78	5.12	1008	-4.31	0.15	591	-5.2	0.24	3.2 [0.001]
$TI1_{ij.t}$	2216	0.004	0.009	800	0.008	0.0004	339	0.002	0.0002	12.93 [0.000]
$TI2_{ij.t}$	2089	0.003	0.005	800	0.004	0.0001	277	0.002	0.0002	6.24 [0.000]
$IFI_{ij.t}$	3410	1.14	0.58	1008	1.11	0.01	602	1.21	0.03	-2.85 [0.004]

Source : Author.
Note: ECOWAS (WAEMU and Non-WAEMU); t-test (assumption of unequal variances).H0: egality of means. [.] , p-value; N, number of observations; Std, standard deviation.

[3] As Shang Wei (1996), this paper uses production data for agriculture, mining and total manufacturing.

According to table 2, business cycles synchronization and bilateral trade are on average higher in the WAEMU zone than in the Non-WAEMU zone. Indeed, the synchronization of business cycles in WAEMU is -4.31, while that of the Non-WAEMU zone is -5.2. In addition, the degree of bilateral trade in the WAEMU zone is 0.008 according to TI1 and 0.004 according to TI2, which represents respectively four and two times the degree of bilateral trade in the Non-WAEMU zone which is 0.002 according to TI1 and TI2.

These statistics indicate not only higher intracommunity trade in WAEMU than in the Non-WAEMU zone but also show that WAEMU countries have more synchronous business cycles than Non-WAEMU countries. The t-test of means-difference reveals that business cycles synchronization and trade integration in WAEMU are significantly higher than in Non-WAEMU countries. This difference between these zones can be explained in part by the single currency in WAEMU. Indeed, monetary union reduces transaction costs and thus leads to an increase intracommunity trade (Bangake and Eggoh, 2008; Carrère, 2004; Rose 2000). It increases intra- branch trade, thus favoring the synchronization of business cycles (Baxter and Kouparitsas, 2005; Caldéron et al. 2007; Inklaar et al. 2008; Frankel and Rose, 1998; Tapsoba 2009)[4].

In addition, the degree of international financial integration in the WAEMU zone is 1.11 which is lower than the Non-UEMOA zone which the degree is 1.21. The average comparison test shows that the difference is significant. According to the theory, we expected that the WAEMU zone will be more financially open than the Non-WAEMU zone because the single currency is perceived by economic actors as a strong act, a lasting commitment because it excludes any possibility of competitive devaluation in the future. The result is an increase in foreign direct investment, a strengthening of economic and financial integration. However, the weakness of international financial integration in the WAEMU zone can be explained by the fact that financial integration was an integral part of the regional economic integration program with a view to creating a single currency in the Non-WAEMU[5] zone compared to WAEMU.

As bilateral trade, we believe that international financial integration has a positive effect on the synchronization of business cycles. Greater financial links can increase the synchronization of business cycles. In fact, a shock that affects a country does not remain at the national level. It spreads abroad because the national agents recall the foreign assets to face the constraint (Dedola and Lombardo, 2012; Kalemli-Ozcan et al. 2013b).

Thus, conducting economic policies for trade integration and international financial integration would contribute to increase the synchronization of business cycles. Ad hoc tests are conducted to provide more detail on the relevance and relationship between bilateral trade, financial openness and synchronization of business cycles.

[4] The specification of the model (fixed effects) doesn't allow to introduce a dummy that takes 1 if the pair i,j share a common currency and 0 otherwise to test the impact of a common currency on bilateral trade. Based on Bangake and Eggoh (2008), we assume that the common currency increases bilateral trade in WAEMU and, by extension, will increase bilateral trade in ECOWAS.

[5] Institut Monétaire de l'Afrique de l'Ouest ,2016. Intégration monétaire dans la Zone Monétaire de l'Afrique de l'Ouest .Series de documents d'activité de l'IMAO, 5.

4. Results and interpretations

4.1 Baseline results

Table 3 presents the baseline results of the impact of bilateral trade and international financial integration on the synchronization of business cycles. F-statistic on the excluded instruments in the first stage is greater than 10, one need worry no further about weak instrument (Staiger and Stock, 1997). Panel B shows that bilateral trade costs explain trade integration at the 1% threshold. When the bilateral trade costs increase by 1%, bilateral trade according to IC1 (respectively to IC2) increases by 0.37% (respectively by 0.38%). Panel A reports the main results of equation (5). The results without and with instrumental variable indicate that bilateral trade and international financial integration have positive and significant effects at the 1% threshold on the synchronization of business cycles.

Table3 : Baseline results

Panel A : Baseline results				
Synchronization of business cycles ($S_{ij,t}$)				
Explanatory variables	Estimate 1		Estimate 2	
	Without instrument	With instrument	Without instrument	With instrument
$\ln(TI_{ij,t})$	0.4*** (0.09)	0.47*** (0.1)	0,4*** (0,09)	0,47*** (0,1)
$\ln(IFI_{ij,t})$	1.49*** (0.5)	1.44*** (0.5)	1,42*** (0,51)	1,42*** (0,5)
Observations	2077	2077	2079	2079
Country pairs	94	94	94	94
R^2 (within)	0.1375	0.1373	0,1358	0,1357
Country-pair fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Panel B : first stage of IV estimate				
Explanatory variables	$\ln(TI1_{ij,t})$		$\ln(TI2_{ij,t})$	
$\ln(IFI_{ij,t})$	-0.08 (0.09)		0.02 (0.08)	
$\ln(\lambda_{ij,t})$	0.37*** (0.02)		0.38*** (0.02)	
F-statistic	32.85***		51.83***	
Country-pair fixed effect	Yes		Yes	
Year fixed effect	Yes		Yes	

Source: author estimates.

Note: estimate 1 and estimate 2 represent estimations with $\ln(TI1_{ij,t})$ and $\ln(TI2_{ij,t})$ respectively. (.) Standard deviation; *** p <0.01, ** p <0.05, * p <0.1. Regressions are also corrected for heteroscedasticity by the cluster method.

Estimation without instrument shows that an increase in bilateral trade (respectively international financial integration) of 1% is associated with an increase in the synchronization of business cycles of 0.004 (respectively 0.0149) according to IC1 and 0.004 (respectively 0.0142) according to IC2. Estimation with instrument shows that an increase in bilateral trade (respectively international financial integration) of 1% is associated with an increase in the synchronization of business cycles of 0.0047 (respectively 0.0144) according to IC1 and 0.0047 (respectively 0.0142) according to IC2. Thus, the results show that bilateral trade and international financial integration are determinants of the synchronization of business cycles in ECOWAS. However, robustness tests are conducted to consolidate the different results obtained.

4.2 International financial integration (de jure)

In this section, we replace international financial integration (de facto) by international financial integration (de jure) to show that whatever approach is used, international financial integration contributes to increase the synchronization of business cycles between ECOWAS countries. To verify that, we use Chinn-Ito index (2006)[6] noted KAOPEN.

Chinn-Ito Index (2006) estimates the degree of de jure financial openness of economies by using Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), established by the IMF, which provides details about the restrictions on international financial transactions. This index ranges from −1.91 to 2.36. A country very financially open (respectively very closed) displays a score of 2.36 (respectively -1.91).So, higher values imply higher financial integration.

Thus, international financial integration (de jure) of i and j is defined as follows:

$$KAOPEN_{ij,t} = KAOPEN_{it} + KAOPEN_{jt} \quad (8)$$

The results presented in panel A of table 4 show that whatever bilateral trade, it contributes at the threshold of 1% to increase the synchronization of business cycles which is consistent with previous results. In addition, international financial integration (de jure) has a positive and significant effect at the 1% threshold on the synchronization of business cycles. Whatever bilateral trade, the results without and with instrumental variable indicate that a financial openness of 1% is associated with an increase in the synchronization of business cycles of 0.0016 and 0.0022 respectively.

Thus, whatever approach is used, bilateral trade and international financial integration contribute to increase the synchronization of business cycles in ECOWAS.

[6] Data on Chinn-Ito index (2006) come from the site : http://web.pdx.edu/~ito/Chinn-Ito_website.htm

Table 4: Baseline results (with $KAOPEN_{ij,t}$)

Panel A : Baseline results				
Synchronization of business cycles ($S_{ij,t}$)				
Explanatory variables	Estimate 1		Estimate 2	
	Without instrument	With instrument	Without instrument	With instrument
$\ln(TI_{ij,t})$	0.39*** (0.1)	0.44*** (0.11)	0,4*** (0,1)	0,45*** (0,1)
$\ln(KAOPEN_{ij,t})$	0.16*** (0.06)	0.16*** (0.06)	0,22*** (0,06)	0,22*** (0,06)
Observations Country pairs R^2 (within) Country-pair fixed effect Year fixed effect	2023 94 0.1308 Yes Yes	2023 94 0.1306 Yes Yes	2025 94 0,129 Yes Yes	2025 94 0,1289 Yes Yes
Panel B : first stage of IV estimate				
Explanatory variables	$\ln(TI1_{ij,t})$		$\ln(TI2_{ij,t})$	
$\ln(IFI_{ij,t})$	-0.04 (0.03)		-0.03 (0.02)	
$\ln(\lambda_{ij,t})$	0.37*** (0.02)		0.38*** (0.02)	
F-statistic Country-pair fixed effect Year fixed effect	28.92*** Yes Yes		51.94*** Yes Yes	

Source: author estimates.

Note: estimate 1 and estimate 2 represent estimations with $\ln(TI1_{ij,t})$ and $\ln(TI2_{ij,t})$ respectively. $KAOPEN_{ij,t}$ takes negative values then we consider $\ln KAOPEN_{ij,t} = \ln(KAOPEN_{ij,t} + c)$ with c a constant. As, Min $(KAOPEN_{ij,t}) = -3.820859$,so we take c = 3.82086. (.) Standard deviation; *** p <0.01, ** p <0.05, * p <0.1.

Regressions are also corrected for heteroscedasticity by the cluster method.

4.3 Bilateral trade between ECOWAS countries and the Eurozone

In this part, it is a question of showing that the structure of the trade of the ECOWAS countries is not an obstacle to the monetary union because bilateral trade between the ECOWAS countries and the Eurozone (principal partner) also accentuates the synchronization of business cycles within the ECOWAS countries. To verify that, we rely on measures of bilateral trade between countries i and j to build trade integration measures between countries i, j and Eurozone z as follows:

$$TI1_{ijz,t} = \frac{M_{ijz,t} + X_{ijz,t}}{(M_{it} + X_{it}) + (M_{jt} + X_{jt}) + (M_{zt} + X_{zt})} \quad (9)$$

$$TI2_{ijz,t} = \frac{M_{ijz,t} + X_{ijz,t}}{GDP_{ij,t}\,(1-a_{ij,t}) + GDP_{zt}\,(1-a_{z,t})} \quad (10)$$

Where $a_{ij,t} = GDP_{ij,t} / GDP_{ijz,t}$ and $a_{zt} = (GDP_{zt}) / GDP_{ijz,t}$ represent respectively the weight of i, j and the weight of the Eurozone in an economy made up of ECOWAS and the Eurozone. $M_{ijz,t}$ is the sum of imports of countries i and j from the Eurozone z. $X_{ijz,t}$ is the sum of exports of countries i and j to the Eurozone. X_{zt} and M_{zt} are respectively the total exports of the Eurozone to the rest of the world and the total imports of the Eurozone from the rest of the world. $GDP_{ij,t}$ is the sum of GDP of countries i and j, GDP_{zt} is the GDP of Eurozone and $GDP_{ijz,t}$ the sum of GDP of i, j and z.

Trade integration between ECOWAS countries i, j and the Eurozone is instrumentalized according to equation (6) as follows:

$$\ln(TI_{ijz,t}) = \mu_{ijz} + \gamma_t + \alpha_1 \ln(IF_{ij,t}) + \alpha_2 \ln(\lambda_{ijz,t}) + \varepsilon_{ij,t} \quad (11)$$

Where μ_{ijz} and γ_t respectively represent the effect specific to threesome i, j, z and the year effects. $\lambda_{ijz,t}$ which represents the trade costs between countries i, j and the Eurozone z is measured as follows:

$$\lambda_{ijz,t} = \frac{M_{ijz,t}}{M_{ii,t} + M_{jj,t}} \quad \frac{M_{zij,t}}{M_{zz,t}} \quad (12)$$

With $M_{zij,t}$ the import of Eurozone from countries i and j. $M_{zz,t}$ is the import of Eurozone from itself which is the difference between the total output[7] of the Eurozone and the total export of the Eurozone to the rest of the world.

F-statistic (excluded instruments) in table 5 validates the relevance of the instrument used. Panel B shows that trade costs explain at the 1% threshold trade integration. Whatever trade integration, an increase in trade costs of 1% is associated with an increase in trade integration of 0.33%. In addition, panel B shows that an increase in international financial integration of 1% is associated with a decline in trade integration between ECOWAS countries and the Eurozone of 0.2535% according to estimation 1 and 0.2% according to estimation 2. This is not surprising because financial openness is accompanied by a fall in the share of trade between

[7] Data come from the structural analysis of the Organization for Economic Cooperation and Development (OECD's STAN database).

ECOWAS and the Eurozone for the benefit of trade between ECOWAS (or the Eurozone) with the rest of the world.

Table 5: Baseline results (with $TI_{ijz,t}$)

Panel A : Baseline results				
Synchronization of business cycles ($S_{ij,t}$)				
Explanatory variables	Estimate 1		Estimate 2	
	Without instrument	With instrument	Without instrument	With instrument
$\ln(TI_{ijz,t})$	1.04*** (0.11)	1.13*** (0.12)	1.27*** (0.15)	1.47*** (0.16)
$\ln(IFI_{ij,t})$	1.33*** (0.4)	1.39*** (0.39)	1.47*** (0.4)	1.53*** (0.39)
Observations	3362	3362	3362	3362
Country pairs	105	105	105	105
R^2 (within)	0.1297	0.1297	0.1297	0.1297
Country-pair fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Panel B : first stage of IV estimate				
Explanatory variables	$\ln(TI1_{ijz,t})$		$\ln(TI2_{ijz,t})$	
$\ln(IFI_{ij,t})$	-0.2535*** (0.04)		-0.2*** (0.03)	
$\ln(\lambda_{ij,t})$	0.33*** (0.01)		0.33*** (0.01)	
F-statistic	1219.84***		2414.73***	
Country-pair fixed effect	Yes		Yes	
Year fixed effect	Yes		Yes	

Source: author estimates.

Note: estimate 1 and estimate 2 represent estimations with $\ln(TI1_{ijz,t})$ and $\ln(TI2_{ijz,t})$ respectively. (.) Standard deviation; *** p <0.01, ** p <0.05, * p <0.1. Regressions are also corrected for heteroscedasticity by the cluster method.

The results of panel A show that international financial integration and trade integration between i, j and the Eurozone contribute at the 1% threshold to increase the synchronization of business cycles. Indeed, according to estimation 1, the results without and with instrumental variable indicate that an increase in trade integration between i, j and the Eurozone of 1% is associated with an increase in the synchronization of the business cycles of 0.0104 and 0, 0113 respectively. According to estimation 2, the results without and with instrumental variable indicate that an increase in trade integration between i, j and the Eurozone of 1% is associated with an increase in the synchronization of the business cycles of 0.0127 and 0.0147 respectively.

Thus, the weakness of intra-regional trade is not an obstacle to the synchronization of business cycles because the results show that trade between the ECOWAS countries and the Eurozone tend to increase the synchronization of business cycles.

4.4 Alternative measures: common shocks and specific shocks

Morgan et al. (2004), Kalemli-Ozcan et al. (2013a, 2013b), introduce an alternative measure of business cycle to control common shocks as follows:

$$S^{e}_{ij,t} = -\left| e_{it} - e_{jt} \right| \tag{13}$$

Where e_{it} and e_{jt} respectively represent the estimations of the classic errors terms ε_{it} and ε_{jt} from the regressions of real GDP growth rates (per capita in our case) of countries i and j on year and country fixed effects:

$$\begin{aligned} G_{it} &= \alpha_i + \gamma_t + \varepsilon_{it} \\ G_{jt} &= \alpha_j + \gamma_t + \varepsilon_{jt} \end{aligned} \tag{14}$$

Intuitively, $S^{e}_{ij,t}$ measures how similar GDP per capita growth rates are between two countries in any given year, accounting for the average growth in each country and the average growth in each year. $S^{e}_{ij,t}$ thus controls the shocks that are common to G_{it} and G_{jt}. However, it assumes that these common shocks have homogeneous effects in countries i and j, which is not always true. This observation is all the more real since it concerns West African countries. Indeed, consider for instance an oil price shock such as a fall in the price of crude oil and an external monetary policy shock such as a rise in the key rate of the European Central Bank (ECB) as two shocks common to the ECOWAS states.

Face of a fall in the price of crude oil, a country that is mainly dependent on the export of crude oil will experience weak growth, while a crude oil importing country may experience strong growth. This is the case of Nigeria, whose fall in the price of oil at the end of 2014 has been the most affected in Africa. As for Côte d'Ivoire, it has been able to take advantage of the fall in the price of oil, recording the best real GDP growth rate in West Africa in 2015 according to the report of the United Nations Economic Commission (2017).

On the monetary regime, the pegging of the “Franc CFA” to a strong currency such as the euro forces the Central Bank of West African States (BCEAO) to conduct a monetary policy similar to the ECB. Indeed, in a fixed exchange rate regime with a free flow of capital, it is impossible for the BCEAO to have a monetary policy that is durably different from the anchor zone, which is the Eurozone (Revue d'Economie Financial, 2013). Thus, a rise in the ECB's key rate will not have the same impact on the macroeconomic variables of WAEMU countries and other countries in the region, such as Ghana and Sierra Leone, which adopt a flexible exchange rate regime.

From the foregoing, considered that the common shocks to real GDP per capita growth rates cause homogeneous variations of the latter between the economies of a region is surreal

and may skew the evaluation of $S^{e}_{ij,t}$. In order to take into account common shocks with heterogeneous effects between the economies of a region, the paper bases on Cesa-Bianchi et al. (2018).

Let N be the number of real GDP per capita growth rates studied, T the number of observations for each variable. The exact model (in which the factors explain the whole correlation between the variables) from G_{it} to r factors (f_{kt}) k = 1, ..., r can be written as follows:

$$G_{it} = \mu_i + \lambda_{i1} f_{1t} + \lambda_{i2} f_{2t} + \lambda_{i3} f_{3t} + \ldots \lambda_{ir} f_{rt} + \varepsilon_{it} \quad (15)$$

With $i = 1, \ldots \underset{=15}{N}$ (here the number of G_{it} is equal to the number of countries studied);

$t = 1, \ldots \underset{=36}{T}$ and $r < N$.

μ_i represents the average of the real GDP per capita growth rate of country i, λ_{ik} the weights of the factors measuring the covariances between the observed variable of country i and the common factors k and ε_{it} represents the share of Git which is not explained by the common factors .

In the matrix form, Eq. (15) is as follows:

$$G_t = \mu + \Lambda f_t + \varepsilon_t \quad (16)$$

Where $G_t = (G_{1t}, G_{2t}, ..., G_{Nt})'$ and $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t}, \ldots \varepsilon_{Nt})'$ of vectors of dimension N, $f_t = (f_{1t}, f_{2t}, \ldots f_{rt})'$ a vector of dimension r, Λ a dimension matrix (N, r) and under the following assumptions:

$$E(\varepsilon_t)=0 \ , \ E(f_t)=0 \ , \ E(\varepsilon_t\varepsilon_t')=D=\mathrm{diag}(d_1,\ldots,d_N) \ ;$$

$$E(f_tf_t')=I_r \ , \ E(f_t\varepsilon_\tau') = 0 \ \forall \ (t,\tau) \ ;$$

$$E(f_tf_\tau') = 0 \ \forall \ (t,\tau) \text{ with } t \neq \tau \ ;$$

$$E(\varepsilon_t\varepsilon_\tau') = 0 \ \forall \ (t,\tau) \text{ with } t \neq \tau.$$

Ir is the identity matrix of dimension r and $(d_1, ..., d_N)'$, a vector of N positive parameters to estimate. When r is very small in front of N, the model makes it possible to obtain a parsimonious representation of the covariances between the G_{it}.

In this static model, the r common factors are not auto-correlated. It can also be assumed, without loss of generality, that they are not correlated with each other and that they are of unit variance. Since ε_{it} are two uncorrelated pairs, the entire correlation between the observed G_{it} passes through the factors (Bessec and Doz, 2012). The variance of each real GDP per capita growth rate can be written as follows:

$$Var(G_{it}) = \sum_{k=1}^{r} \lambda^2_{ik} + d_i$$

Where λ^2_{ik} is the share of the variance of G_{it} explained by the factor k and $\sum_{k=1}^{r} \lambda^2_{ik}$ is the total share of the variance (communality) captured by the r factors.

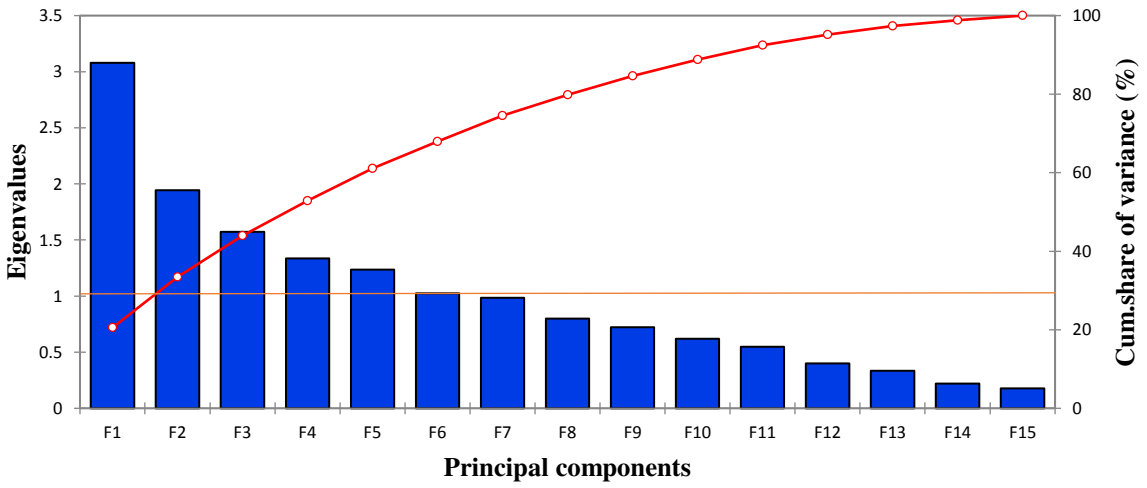
In addition, the variance-covariance matrix of the different G_{it} is written as follows:

$$Var(G_t) = \Lambda\Lambda' + D$$

Where D is diagonal, the covariances between the G_{it} are expressed explicitly according to the weights of the factors (factor loadings).

In this paper, factor extraction is based on principal component analysis (PCA). It defines factors that may or not be common to two or more countries. In this section, each growth rate of real GDP per capita is centered and reduced. A technique for distinguishing common factors from specific factors is based on eigenvalues: principal components with an associated eigenvalue greater than 1 are considered factors common to at least two countries and less than 1 as factors specific to each country.

Chart 3 : factors estimated for real GDP per capita growth rates



Source: Author.
Note: principal components are calculated on the panel of 15 series of real GDP per capita growth rate (G_{it}) over the period 1980-2015.

Chart 3 shows that f_1, ... f_6 are common factors to the fifteen G_{it} because their eigenvalues are greater than 1. Common factors to at least two countries are sufficient to explain for more than 68% of the variance in different real GDP per capita growth rates. The eigenvalues, the coordinates of the common factors and the factor loadings are available from the author.

From the foregoing:

$$G_{it} = \hat{\lambda}_{i1}\hat{f}_{1t} + \hat{\lambda}_{i2}\hat{f}_{2t} + \hat{\lambda}_{i3}\hat{f}_{3t} + \hat{\lambda}_{i4}\hat{f}_{4t} + \hat{\lambda}_{i5}\hat{f}_{5t} + \hat{\lambda}_{i6}\hat{f}_{6t} + \varepsilon_{it} \quad (17)$$

With $\hat{\mu}_i = 0$ because G_{it} is centered.

Eq.(17) makes it possible to construct two alternative measures of $S_{ij,t}$: a measure of the synchronization of business cycles controlling exclusively the specific shocks called $S^{f}_{ij,t}$ and another controlling exclusively the common shocks called $S^{\varepsilon}_{ij,t}$. Based on Eq.(1):

$$S^{f}_{ij,t} = -\left|(\hat{\lambda}_{i1} - \hat{\lambda}_{j1})f_{1t} + (\hat{\lambda}_{i2} - \hat{\lambda}_{j2})f_{2t} + (\hat{\lambda}_{i3} - \hat{\lambda}_{j3})f_{3t} + (\hat{\lambda}_{i4} - \hat{\lambda}_{j4})f_{4t} + (\hat{\lambda}_{i5} - \hat{\lambda}_{j5})f_{5t} + (\hat{\lambda}_{i6} - \hat{\lambda}_{j6})f_{6t}\right| \quad (18)$$

$$S^{\varepsilon}_{ij,t} = -\left|\hat{\varepsilon}_{it} - \hat{\varepsilon}_{jt}\right| \quad (19)$$

Chart 4 shows that the year 1998 is associated with a much more significant fall of $S^{f}_{ij,t}$ compared to $S^{\varepsilon}_{ij,t}$. This year is characterized by political instability in Togo, Guinea-Bissau, one year after its accession in the WAEMU zone. The year 1999 is marked by the beginning of the second Liberian war, the devaluation of the Nigerian currency and the creation of the Eurozone[8]. These events are associated with a much more significant fall in $S^{f}_{ij,t}$ compared to $S^{\varepsilon}_{ij,t}$ and finally the crisis in the Eurozone 2010-2013 is associated with a much more significant fall in $S^{f}_{ij,t}$ compared to $S^{\varepsilon}_{ij,t}$.

This analysis shows that $S^{f}_{ij,t}$ which controls heterogeneous effects in the different ECOWAS countries, is more sensitive to specific events than $S^{\varepsilon}_{ij,t}$ which controls events that have a homogeneous impact on all the countries of the region. $S^{f}_{ij,t}$ then makes it possible to measure the synchronization of business cycles in response to common shocks and $S^{\varepsilon}_{ij,t}$ the synchronization of business cycles in response to specific shocks.

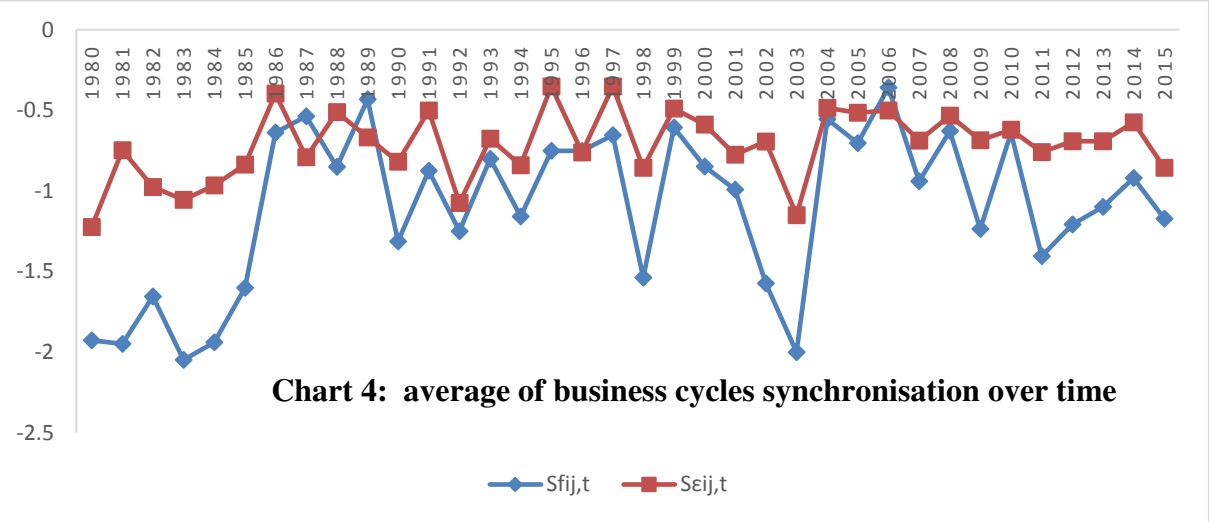


Chart 4: average of business cycles synchronisation over time

Source: Author.
Note: Average is calculated on 105 pairs of countries per year.

The results in table 6 show that bilateral trade has a positive and significant impact at the 1% threshold on the synchronization of business cycles. Indeed, they show that, whatever the trade integration, in response to common shocks an increase in bilateral trade of 1% is associated with an increase in the synchronization of business cycles without and with instrumental variable of 0.0005 and 0.0008 respectively.

[8] Before 1999, 1 French franc = 100 franc CFA. Since 1 January 1999, 1 euro = 655,957 franc CFA.

Table 6: baseline results (using alternative measures of $S_{ij,t}$)

Synchronization of business cycles in response to common shocks ($S^F_{ij,t}$)				
Explanatory variables	Estimate 1		Estimate 2	
	Without instrument	With instrument	Without instrument	With instrument
$\ln(TI_{ij,t})$	0.05***	0.08***	0.05***	0.08***
	(0.01)	(0.02)	(0.01)	(0.02)
$\ln(IFI_{ij,t})$	0.2**	0.16*	0.16*	0.14*
	(0.09)	(0.09)	(0.09)	(0.09)
Observations	2077	2077	2079	2079
Country pairs	94	94	94	94
R^2 (within)	0.2772	0.2772	0.2777	0.2777
Country-pair fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Synchronization of business cycles in response to specific shocks ($S^\varepsilon_{ij,t}$)				
Explanatory variables	Estimate 1		Estimate 2	
	Without instrument	With instrument	Without instrument	With instrument
$\ln(TI_{ij,t})$	0.03***	0.03***	0.03***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)
$\ln(IFI_{ij,t})$	0.03	0.02	0.03	0.02
	(0.05)	(0.05)	(0.05)	(0.05)
Observations	2077	2077	2079	2079
Country pairs	94	94	94	94
R^2 (within)	0.1555	0.1555	0.1557	0.1557
Country-pair fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes

Source: author estimates.

Note: estimate 1 and estimate 2 represent estimations with $\ln(TI1_{ij,t})$ and $\ln(TI2_{ij,t})$ respectively. (.) Standard deviation; *** p <0.01, ** p <0.05, * p <0.1. Regressions are also corrected for heteroscedasticity by the cluster method.

Without or with instrumental variable, whatever bilateral trade, in response to specific shocks, an increase in bilateral trade of 1% is associated with an increase in the synchronization of business cycles of 0.0003. In response to common shocks, international financial integration has a positive but less significant impact on the synchronization of business cycles. Indeed, except for the coefficient associated with financial integration according to estimation 1 (without instrument) that is significant at the 5% threshold, in response to common shocks, international financial integration has a positive and significant impact at the 10% threshold on the synchronization of business cycles.

According to estimation 1, an increase in international financial integration of 1% is associated with an increase in the synchronization of business cycles without and with

instrumental variable of 0.002 and 0.0016 respectively. According to estimation 2, an increase in international financial integration of 1% is associated with an increase in the synchronization of business cycles without and with instrumental variable of 0.0016 and 0.0014 respectively. In response to specific shocks, international financial integration has unfortunately no significant effect on the synchronization of business cycles.

Thus, table 6 shows that, whatever the alternative measure, bilateral trade has a positive and significant impact on the synchronization of cycles to the detriment of international financial integration. Trade integration is thus the main determinant of the synchronization of business cycles. However, the financial integration is not negligible because it contributes to increase the synchronization of business cycles.

5. Implications in terms of economic policies

The results of the study show that the asymmetry of the cycles between the West African countries must not block the political decision for an enlarged monetary union since the latter favors the convergence of business cycles. Indeed, the monetary union by reducing transaction costs increases trade integration which ultimately contributes to increasing the synchronization of business cycles. By analyzing other determinants of the business cycle synchronization, the results show that bilateral trade and international financial integration contribute to increase the synchronization of business cycles in ECOWAS. In addition, the study indicates that the weakness of intracommunity trade is not an obstacle to the monetary union because trade between ECOWAS countries and its main trading partner contributes to business cycles synchronisation come closer.

These results imply that ECOWAS decision-makers can overcome the obstacle of asymmetric cycles by taking action in favor of the synchronization of business cycles. In our case, the leaders of ECOWAS must promote the sharing of a common currency in ECOWAS and other actions in the intensification of trade. In addition, they must work to strengthen international financial integration. For a reinforcement of the trade integration, ECOWAS decision-makers must work for the free circulation of the products because certain goods (materials of constructions, fish) circulate less and others are pushed back straight to the borders of some states (Kpaye and Tsigbé , 2017),which limits the liberalization of trade.

The export profile of the ECOWAS countries (gold, cotton, cocoa, aluminum, rubber, diamonds, crude oil, pisces,…) suggests huge opportunities for trade. However, solidarity between member states should be strengthened to create poles for the development of processing industries so as to pool resources and energies. In addition, the multiplicity of official control points and the slowness of customs administrations considerably limit trade between member countries. For example, on the axis Togo (Lomé) - Burkina Faso (Ouagadougou) distant 986 km, there are 34 checkpoints and on the axis Niger (Niamey) - Burkina Faso (Ouagadougou) distant 529 km there exists 20 checkpoints (Kpaye and Tsigbé, 2017). Thus, the reduction of official control points on the roads will encourage trade.

The reinforcement of transport infrastructure, the abolition of levies and other taxes which do not fall under the common external tariff (TEC) with regard to Non-Community countries will make it possible to significantly strengthen the commercial partnerships between the member states of the union. As the economic efficiency of financial integration is subject to

threshold effects, financial integration must go hand in hand with an improvement of the business climate, which can constrain financial development, and the implementation of policies geared towards better access to financial services (Amadou Sy, 2014).

In addition, national financial regulations must also ensure equal treatment of financial institutions by removing any barriers to entry, discrimination in their activities and, at regional level, by harmonizing the conditions of competition. Reconciling the banks with their customers, either physically or virtually, as well as improving internal management, will reduce transaction costs in the region that are historically high. In addition, promoting competition among banks by diversifying operators, financial products and services will facilitate financial inclusion.

6. Conclusion

The results of the study show that the asymmetry of the cycles between the West African countries must not block the political decision for an enlarged monetary union since the latter favors the convergence of business cycles. In addition, the results indicate that bilateral trade and international financial integration (de facto or de jure) are determinants of the synchronization of business cycles in the region. Moreover, the study shows that the weakness of intracommunity trade is not a hindrance to the monetary union because trade between the ECOWAS countries and the Eurozone increases the synchronization of business cycles.

Finally, the study shows that trade channel is more efficient than international financial integration channel. Indeed, in response to specific or common shocks, bilateral trade has a positive and significant impact on the synchronization of business cycles, unlike international financial integration, which has only an effect on the synchronization of cycles in response to common shocks. However, the latter should not be neglected because it contributes to increasing the synchronization of business cycles.

Several implications for the region derive from these results. Monetary union in West Africa is possible because the latter stimulates intracommunity trade and thus synchronizes cycles. ECOWAS decision-makers must work to strengthen trade between ECOWAS countries and outside the region. In addition, they need to ensure that financial regulations are relaxed in order to increase the effectiveness of financial integration in increasing business cycles.

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Table 7: coordinates of the common factors

Year	F1	F2	F3	F4	F5	F6
1980	-3.118	-2.091	-1.694	1.906	0.030	-0.673
1981	-1.498	1.336	3.447	-2.235	-0.010	-0.384
1982	-1.322	1.599	2.739	-1.208	2.619	0.319
1983	-5.521	1.572	0.264	2.501	0.811	0.501
1984	-2.770	-1.931	-0.387	-2.600	-1.245	-0.314
1985	2.649	1.009	0.490	0.557	-1.590	2.175
1986	0.583	0.734	0.161	0.497	0.845	0.597
1987	-1.232	-0.075	-0.728	-0.608	0.799	0.512
1988	0.731	-0.290	-0.057	1.360	-1.316	1.222
1989	-0.751	0.702	-0.644	0.221	-0.335	0.274
1990	-1.460	-2.086	-1.015	-1.463	0.210	0.417
1991	0.544	1.126	-0.436	-0.627	0.390	1.898
1992	-2.961	0.096	-0.251	0.022	-1.010	0.080
1993	-1.375	-0.089	1.207	-0.037	1.484	1.029
1994	-1.000	-0.559	0.568	1.819	-2.121	-0.196
1995	0.567	0.286	1.540	0.074	-1.308	-1.086
1996	1.737	0.300	1.018	0.017	-1.200	0.099
1997	0.662	-0.004	0.572	0.448	-1.960	-1.051
1998	1.433	1.280	-0.315	3.009	2.208	-0.893
1999	0.078	1.032	0.597	0.023	-0.373	-0.990
2000	-1.615	-0.483	-0.020	-0.435	-0.170	-0.926
2001	1.154	1.606	-0.477	0.097	-0.204	0.970
2002	0.792	-3.013	-0.269	0.081	1.803	1.504
2003	0.934	3.221	-3.412	-1.004	0.406	-0.241
2004	-0.113	-0.067	-0.709	-0.389	-0.031	-1.455
2005	1.363	0.223	0.369	-0.127	0.244	0.997
2006	0.591	-0.167	-0.497	0.043	-0.128	0.342
2007	0.717	-1.439	1.889	0.989	-0.187	-1.075
2008	1.675	-0.442	-0.228	0.446	0.126	-0.697
2009	-0.773	0.704	-2.869	-1.477	0.029	-0.322
2010	1.262	-0.560	-0.848	0.332	0.172	-0.379
2011	1.085	-2.863	0.283	-0.078	-0.643	2.064
2012	2.670	-1.397	0.285	0.299	1.524	-2.016
2013	1.800	-1.772	-0.289	-0.887	1.124	-1.268
2014	2.054	0.200	-0.082	-1.035	0.401	-0.162
2015	0.431	2.301	-0.200	-0.530	-1.395	-0.871
$E(f_t)$	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

Source : Author.

Note: E (f_t) is null according to one of the hypotheses formulated.

Table 8 : eigenvalues

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15
Eigenvalues	3.08	1.94	1.57	1.33	1.23	1.02	0.98	0.79	0.72	0.62	0.54	0.40	0.33	0.22	0.17
Share of variance	20.5	12.9	10.4	8.90	8.23	6.82	6.56	5.32	4.81	4.14	3.65	2.67	2.22	1.47	1.18
Cum.share of variance	20.53	33.48	43.96	52.87	61.11	67.94	74.50	79.83	84.65	88.79	92.44	95.12	97.34	98.81	100

Source : Author.

Table 9: factor loadings

	F1	F2	F3	F4	F5	F6
Benin	0.257	-0.307	0.207	-0.371	-0.107	-0.203
Burkina Faso	0.703	0.343	0.265	0.097	0.144	0.157
Cabo-Verde	-0.146	-0.003	0.394	0.493	-0.354	-0.234
Côte d'Ivoire	0.697	0.216	0.169	-0.128	-0.026	-0.380
The Gambia	-0.308	0.332	-0.322	0.148	0.013	-0.573
Ghana	0.557	-0.456	-0.374	-0.032	-0.195	0.020
Guinea	0.245	-0.458	0.524	0.305	-0.008	-0.020
Guinea-Bissau	0.014	-0.006	0.341	-0.663	-0.447	0.165
Liberia	0.033	-0.540	0.435	0.152	0.015	-0.010
Mali	0.529	0.405	-0.148	0.163	-0.291	0.442
Niger	0.782	0.194	0.047	0.370	0.217	0.018
Nigeria	0.496	-0.418	-0.576	-0.012	-0.043	0.043
Senegal	0.519	0.385	0.159	-0.387	0.151	-0.334
Sierra Leone	0.206	-0.531	-0.070	-0.141	0.587	-0.080
Togo	0.311	-0.244	-0.256	0.135	-0.582	-0.295

Source : Author.